Check List 8(2): 302-306, 2012
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ISSN 1809-127X (available at *www.checklist.org.br*)

Check List
Journal of species lists and distribution

NOTES ON GEOGRAPHIC DISTRIBUTION

Reptilia, Squamata, Gymnophthalmidae, *Potamites apodemus* (Uzzell, 1966): Distribution extension and first records from Panama

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ABSTRACT: Reporting on the southernmost locality in Costa Rica and the first two localities in Panama, we extend the known geographic distribution of the lizard *Potamites apodemus* (Uzzell, 1966) roughly 20 km eastwards, 40 km southwards, and 175 m in elevation. We provide photos of Panamanian specimens, comment on their morphology, and map the distribution of this unique species.

Thomas Uzzell (1966) described *Neusticurus apodemus* on the basis of seven specimens from "15 kilometers southwest of San Isidro del General, San José, Costa Rica; 865 meters above sea level" in the Pacific drainage of Costa Rica (Figure 1, locality 1). Probably owing to its rather secretive, presumably semiaquatic lifestyle (or, alternatively, to its possibly patchy distribution), this lizard rarely has been collected or otherwise mentioned in literature apart from appearing as a national endemic in Costa Rican faunal lists. Savage (2002) provided information on the species' biology and mapped four additional localities (Figure 1, Localities 2–5): one close to the type locality, one at Rincón de Osa at the base of the Osa Peninsula, and two more lying close to each other about halfway between the type locality and Rincón de Osa. McDiarmid and Savage (2005) reported the species from near Rincón de Osa and from Marenco Biological Station, approximately 20 km west of Rincón de Osa on the Peninsula's west coast (Figure 1, Localities 6 and 7). Later that year, Doan and Castoe (2005) erected the genus *Potamites* for Uzzell's (1966) *Neusticurus strangulatus* group, introducing the new combination *Potamites apodemus.* Finally, after Santos-Barrera *et al.* (2008) had reported four specimens from three localities near San Vito de Coto Brus (Puntarenas province close to the Panamanian border; Figure 1, Localities 8–10), the documented distribution of *P. apodemus* encompassed ten localities in Costa Rica, on a vertical range from 30 to 975 m asl.

During recent fieldwork in Chiriquí province of western Panama and adjacent Costa Rica, we encountered several specimens of *Potamites apodemus* at localities not previously reported for the species (Figure 1, Localities 11–13). All specimens were encountered during opportunistic searches along small streams, caught by hand, and preserved the day after capture. For Panama, the collecting permits SC/A-28-09, SC/A-21-10, and SE/A-8-11, as well as the corresponding exportation permits were issued by the Directorate of Protected Areas and Wildlife of the National Environmental Authority (Dirección de Áreas Protegidas y Vida Silvestre, Autoridad Nacional del Ambiente - ANAM), Panama City, Panama. For Costa Rica, the collecting permit 042-2011-SINAC was issued by the Ministry of Environment, Energy and Telecommunication (Ministerio de Ambiente, Energía y Telecomunicaciones - MINAET), San José, Costa Rica. Our specimens have been deposited

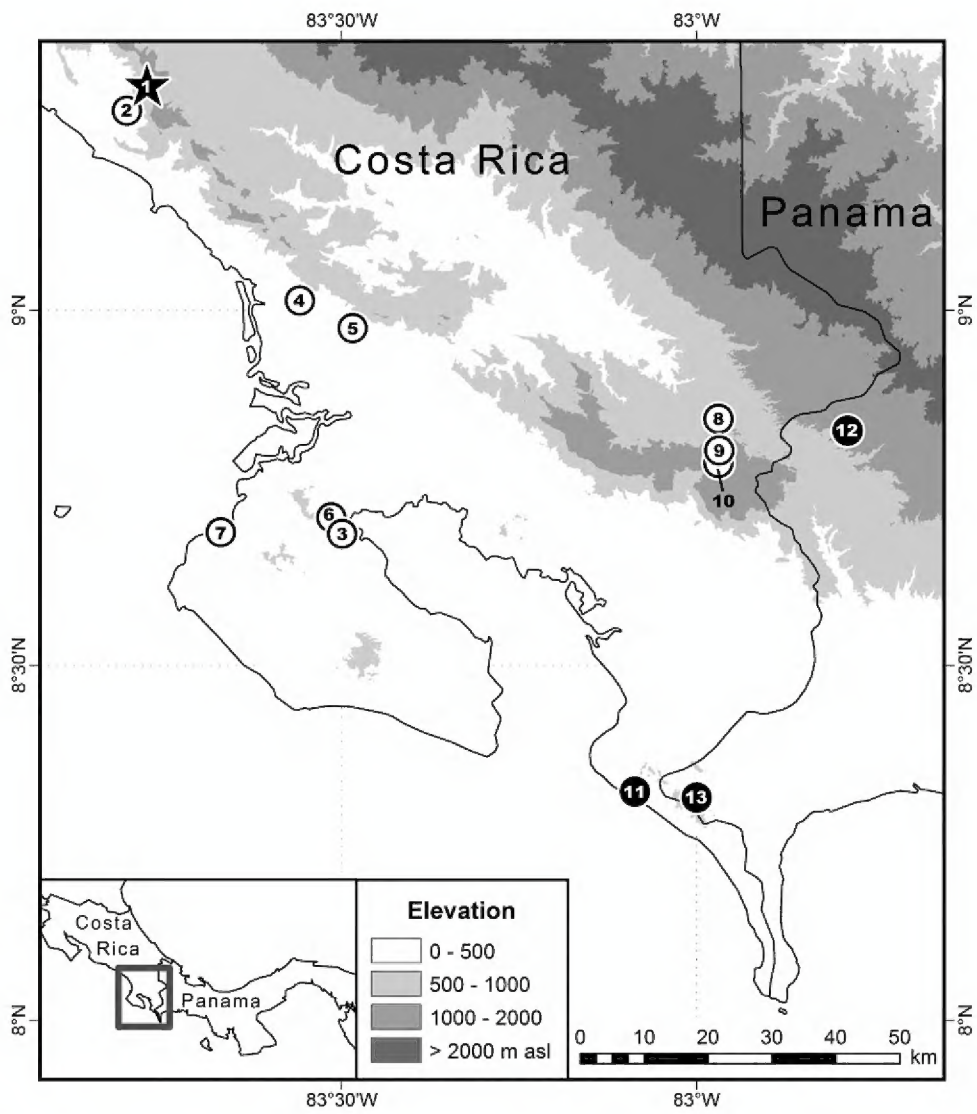

FIGURE 1. Distribution map showing the localities known for *Potamites apodemus* along the Pacific drainage of Costa Rica and western Panama: The star (1) indicates the type locality. White circles represent records from literature: 2–5 Savage (2002), 6 and 7 McDiarmid and Savage (2005), 8–10 Santos-Barrera *et al.* (2008). Black circles represent the new localities reported herein, with 12 and 13 each summarizing three nearby localities

in the herpetological collection of the Senckenberg Forschungsinstitut Frankfurt, Germany (SMF), and in the Museo Herpetológico de Chiriquí (MHCH), the latter being the herpetological collection of the Universidad Autónoma de Chiriquí, Davíd, Chiriquí, Panama. Species identification was carried out employing the keys, figures and descriptions provided by Uzzell (1966), Savage (2002), and Köhler (2008). Adult specimens were sexed by evertion of hemipenes, juveniles by examination of the preanal plate and by the presence or absence of femoral pores. The capitalized colors and color codes (the latter in parentheses) provided for referenced specimens follow those of Smithe (1975–1981). Coordinates and elevation were recorded using Garmin GPS receivers with built-in altimeters. All coordinates are in WGS-84 datum and elevations are rounded to the next tenth.

At Río Coco (Figure 1, Locality 11; Figure 3F), Reserva Conte Burica, about 10 km southeast of Pavones, Distrito de Pavón, Cantón de Golfito, Provincia de Puntarenas, Costa Rica, JV collected two specimens on 19 February 2011, as follows: 08°19'12" N, 83°05'06" W, 110 m asl, SMF 93370, 93371 (two juvenile males).

At Santa Clara (Figure 1, Locality 12), about 9 km east of the border at Río Sereno, Corregimiento de Santa Clara, Distrito de Renacimiento, Provincia de Chiriquí, Panama, AH and SL collected four specimens along small creeks that delimit the Finca Ecológica of Enrique Caballero (Figure 3A and B), as follows: 15 April 2009, 08°49'51" N, 82°47'03" W, 1120 m asl, SMF 89779 (adult male; Figure 2A, D–F); 18 June 2010, 08°49'50" N, 82°47'13" W, 1090 m asl, MHCH 2352 (juvenile male; Figure 2B); 18 June 2010, 08°49'51" N, 82°47'03" W, 1130 and 1150 m asl, SMF 91568 (adult male; Figure 2G–I), and SMF 91569 (juvenile female).

At Chorogo (Figure 1, Locality 13; Figure 3C–E), about 15 km west of Puerto Armuelles, Corregimiento de Puerto Armuelles, Distrito de Barú, Provincia de Chiriquí, Panamá, AB, GK, and JV collected five specimens on 17 March 2011, as follows: 08°18'49" N, 82°59'57" W, 380 m asl, SMF 92117 (adult male), 92118 (juvenile female; Figure 2C), and 92119 (juvenile male); 08°18'34" N, 82°59'39" W, 430 m asl, MHCH 1618 (juvenile female; Figure 2J); 08°18'37" N, 83°00'01" W, 390 m asl, MHCH 1631 (juvenile male).

Río Coco, situated approximately 40 km further to the south (at an airline distance of roughly 60 km southeast) than the records from around Rincón de Osa provided by Savage (2002) and McDiarmid and Savage (2005), is the southernmost locality reported for *Potamites apodemus* in Costa Rica. The specimens from Santa Clara are the easternmost, and those from Chorogo the southernmost specimens ever reported for the species, constituting the first country records for Panama. The Santa Clara specimens expand the documented range of this species about 20 km eastwards and 175 m upwards in elevation from the records around San Vito (Santos-Barrera *et al.* 2008), while the Chorogo specimens originate from about 69 km southeast of Rincón de Osa (Savage 2002; McDiarmid and Savage 2005).

All specimens agree well with the descriptions given by Uzzell (1966) and Savage (2002) in terms of external morphology. As suspected by Uzzell (1966), *Potamites apodemus* obviously exhibits sexual dimorphism not only in the number of femoral-preanal pores (both sexes have four preanal pores that are hardly discernible in our juveniles, whereas femoral pores are present only in males, and visible already in juvenile males), but also in the arrangement of the scales of the preanal plate: In all of our specimens that have femoral pores (*i.e.*, that are males), the preanal plate is composed of two large marginal (*i.e.*, bordering the cloacal opening, called "posterior preanals" by Uzzell 1966) scales, that are preceded anteriorly by two large central and two very small lateral scales (called "anterior preanals" by Uzzell 1966; Figure 2G). In the specimens that lack femoral pores (*i.e.*, that are females), the preanal plate has four marginal scales that are preceded by a similar arrangement of four scales anteriorly (Figure 2J). The juveniles MHCH 1618, with 29 mm snout-vent length, and SMF 93371, with 26 mm snout–vent length, are the smallest juveniles reported for the species.

The coloration in life of an adult male (SMF 89779, Figure 2A, D–F) was recorded as follows: Dorsal and lateral ground color Light Drab (119C), with diffuse Sepia (219) mottling; flanks with a series of five diffuse Sepia (219) ocelli with Drab-Gray (119C) centers; lateral surfaces of head and neck with dirty white mottling; two dirty white stripes descending from below orbit onto infralabials; a large dirty white blotch posterior to tympanum; ventral surfaces of head and body Pearl Gray (81) with heavy Sepia (119) mottling, those of head and neck also with dirty white blotches; ventral surface of tail Sepia (119), the anterior median portion dirty white with a suggestion of Pale Horn Color (92); mental, postmental, first chin shields, and parts of adjacent scales Burnt Orange (116); dorsal surfaces of arms with Buff (124) blotches; iris Raw Umber (223).

The coloration in life of another adult male (SMF 92117) was recorded as follows: Dorsal and lateral ground color Vandyke Brown (121), except Warm Sepia (221A) dorsal head; dirty white line radiating out from eye; Chamois (123D) blotches behind tympanum; chin Salmon Color (106); venter Sepia (119) with Pearl Gray (81) blotches on each scale and a suffusion of Orange-Rufous (132C) medially; iris Prout's Brown (121A).

All individuals were encountered between leaf litter and stones very close to small streams (Figure 3), generally within the streambed less than one meter from the water, and in one case (SMF 89779) even submerged. With the exception of two juveniles from Chorogo, that were found between 10:00 and 12:00 h, and the two specimens from Río Coco, encountered around 17:00 h, all specimens have been encountered at nighttime. These observations support the view of Savage (2002) that *Potamites apodemus* is a riparian species of predominantly crepuscular and nocturnal activity. Nevertheless, it can also be found at daytime, and at some distance from streams (Uzzell 1966; McDiarmid and Savage 2005; Santos-Barrera *et al.* 2008).

Potamites apodemus is an endemic of the Golfo Dulce region as understood by McDiarmid and Savage (2005), who also included *Sphaerodactylus graptolaemus* Harris and Kluge, 1984, *Anolis aquaticus* Taylor, 1956, *Bachia blairi* (Dunn, 1940), and *Lachesis melanocephala* Solórzano and Cerdas, 1986, in this category. *Anolis charlesmyersi* Köhler, 2010, *A. polylepis* Peters, 1874, *Bothriechis supraciliaris* (Taylor, 1954), and *Coloptychon rhombifer* (Peters, 1876) exhibit similar distribution patterns (Köhler 2008; 2010)

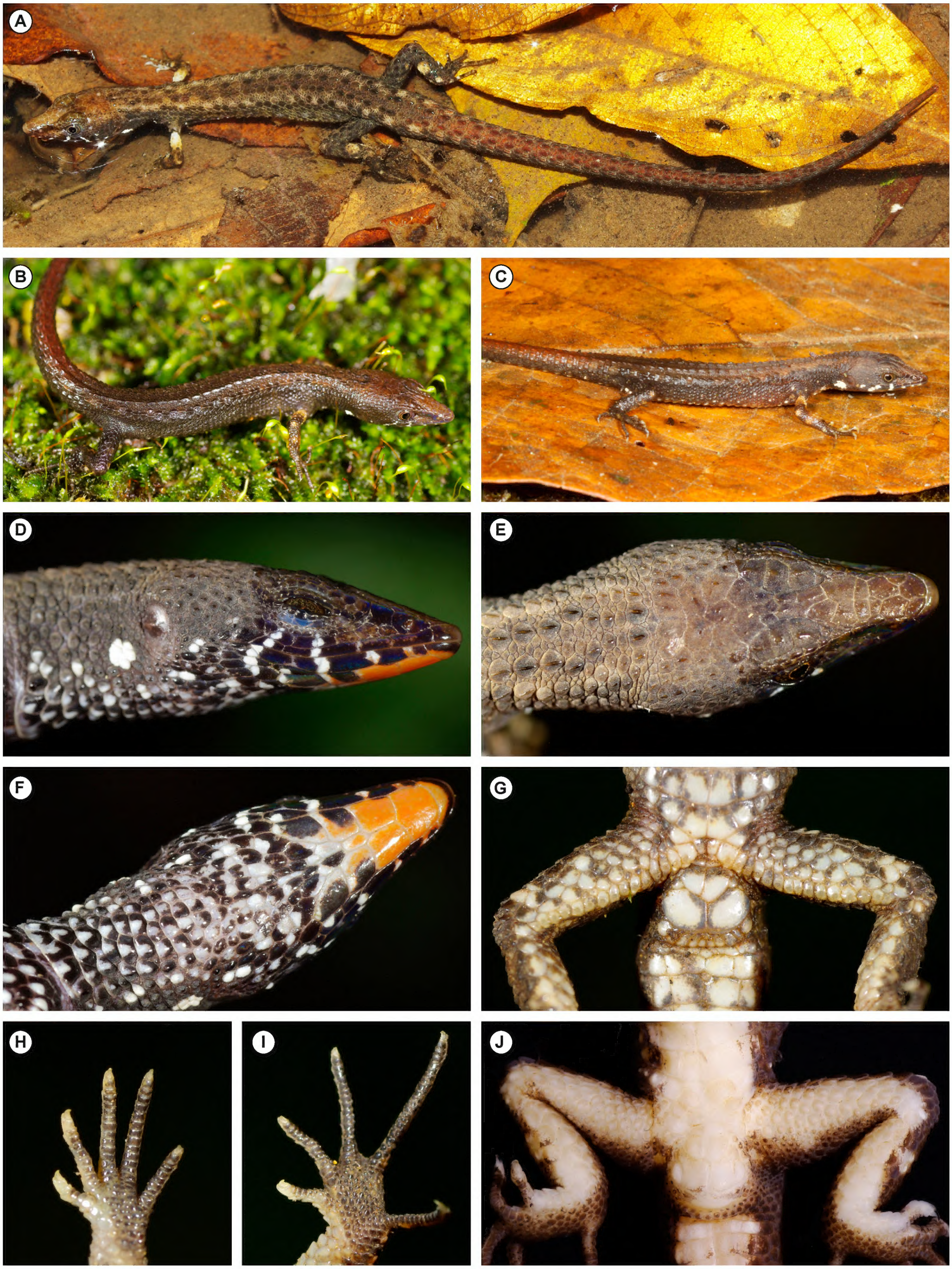

FIGURE 2. Individuals of *Potamites apodemus* from Panama: (A) adult male (SMF 89779) from Santa Clara as encountered at night, submerged in shallow water; (B) juvenile male (MHCH 2352) from Santa Clara; (C) juvenile female (SMF 92118) from Chorogo; (D) lateral, (E) dorsal, and (F) ventral views of head of adult male (SMF 89779); (G) cloacal region of adult male (SMF 91568) from Santa Clara, showing the continuous series of femoral and preanal pores (32 in this example) and the typical scale arrangement of the preanal plate in males; (H) left foot and (I) left hand of SMF 91568; (J) cloacal region of juvenile female (MHCH 1618), showing the lack of femoral pores and the scale arrangement of the preanal plate typical for females.

and may just as well be regarded as "Golfo Dulce endemics". Now that *P. apodemus* is documented for Panama, all mentioned species are binational endemics shared between Costa Rica and Panama, their distributional ranges presumably reflecting the extent of the lowland evergreen rain forests of the Golfo Dulce region (see McDiarmid and Savage 2005). Only the recently described *A. osa* Köhler, Dehling and Köhler, 2010, apparently endemic to the Osa Peninsula itself, is likely to remain restrained to Costa Rica.

To date, none of the aforementioned species has undergone an assessment of their conservation status (IUCN 2011), whereas their rather small distributional ranges should qualify for one of the threatened categories. In fact, based on our own distribution data, we estimate the extent of occurrence of one of the more widely distributed Golfo Dulce endemics, *Anolis polylepis,* as 16945 km^2. The minimum convex polygon drawn around the localities summarized herein for *Potamites apodemus* yields an extent of occurrence of merely 6411 km^2. Furthermore, the Golfo Dulce region along the Pacific versants of eastern Costa Rica and western Panama is dominated by large areas of extensive and intensive

Figure 3. Habitat of *Potamites apodemus* in western Panama and adjacent Costa Rica: (A) Santa Clara: view west over the southern part of Finca Ecológica and adjacent areas of intensive commercial coffee farming, showing riparian forest along creeks; (B) Santa Clara: southern border creek, 1130 m asl; (C) Chorogo: view on forested hill; (D) Chorogo: small stream where three specimens were encountered at night; (E) Chorogo: stream where two specimens were found during daytime; (F) Reserva Conte Burica: Río Coco.

agricultural habitat. To our knowledge, these areas are ever-expanding along with population growth and further development of infrastructure, resulting in ongoing decrease of the few forest remnants which are by now mostly restricted to narrow stretches along streams. In consequence, either of the two species could be placed in the category "Vulnerable" (VU) according to IUCN (2011) criteria B1b(iii). While in Costa Rica several protected areas have been designated to conserve the last patches of Pacific evergreen rainforest, the lowlands and premontane elevations of extreme western Panama are virtually devoid of such measures, and also of reasonably sized forest areas. Thus, immediate action must be taken to preserve the last remaining spots of natural vegetation in the Panamanian province of Chiriquí, with both Chorogo and Meseta de Chorcha being the most suitable and promising areas in our opinion.

Acknowledgments: Collecting and exportation permits were provided by Javier Guevara Sequeira, SINAC Central, Ministerio del Ambiente, Energía y Telecomunicaciones (MINAET), San José, Costa Rica; and by A. Salazar, Y. Hidalgo, J. García, and Carmen Medina, Autoridad Nacional del Ambiente (ANAM), Panama City, Panama. For field assistance at Santa Clara, we thank R. De León. We are most grateful to E. and M. Caballero for the opportunity to work at Santa Clara and their hospitality, and to "La Negra" for logistical support. For support in various ways, we are indebted to M. Piepenbring and O. Cáceres. C. Siler and J. Sunyer provided important suggestions that helped improve the manuscript. This paper is based upon work funded to AH by the FAZIT-Stiftung, and to SL by the Studienstiftung des deutschen Volkes as well as the Vereinigung von Freunden und Förderern der Goethe-Universität.

Literature Cited

Doan, T.M. and T.A. Castoe. 2005. Phylogenetic taxonomy of the Cercosaurini (Squamata: Gymnophthalmidae), with new genera for species of *Neusticurus* and *Proctoporus*. *Zoological Journal of the Linnean Society* 143: 405-416.

Dunn, E.R. 1940. New and Noteworthy Herpetological Material from Panama. *Proceedings of the Academy of Natural Sciences of Philadelphia* 92: 105-122.

Harris, D.M. and A.G. Kluge. 1984. The *Sphaerodactylus* (Sauria: Gekkonidae) of Middle America. *Occasional Papers of the Museum of Zoology, University of Michigan* 706: 1-59.

IUCN. 2011. *IUCN Red List of Threatened Species. Version 2011.2.* Electronic Database accessible at http://www.iucnredlist.org/. Captured on 11 November 2011.

Köhler, G. 2008. *Reptiles of Central America. Second edition*. Offenbach: Herpeton. 400 p.

Köhler, G. 2010. A revision of the Central American species related to *Anolis pentaprion* with the resurrection of *A. beckeri* and the description of a new species (Squamata: Polychrotidae). *Zootaxa* 2354: 1-18.

Köhler, G., D.M. Dehling and J.J. Köhler. 2010. Cryptic species and hybridization in the *Anolis polylepis* complex, with the description of a new species from the Osa Peninsula, Costa Rica (Squamata: Polychrotidae). *Zootaxa* 2718: 23-38.

McDiarmid, R.W. and J.M. Savage. 2005. The herpetofauna of the Rincón area, Peninsula de Osa, Costa Rica, a Central American lowland evergreen forest site; p. 366-427 *In* M.A. Donnelly, B.I. Crother, C. Guyer and M.H. Wake (ed.). *Ecology and evolution in the tropics: a herpetological perspective*. Chicago: The University of Chicago Press.

Peters, W.C.H. 1874. Über neue Saurier (*Spaerodactylus, Anolis, Phrynosoma, Tropidolepisma, Lygosoma, Ophioscincus*) aus Centralamerica, Mexico und Australien. *Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin* 1874: 738-747.

Peters, W.C.H. 1876. Über neue Arten der Sauriergattung *Gerrhonotus. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin* 1876: 297-300.

Santos-Barrera, G., J. Pacheco, F. Mendoza-Quijano, F. Bolaños, G. Cháves and G.C. Daily 2008. Diversity, natural history and conservation of amphibians and reptiles from the San Vito Region, southwestern Costa Rica. *Revista de Biología Tropical* 56(2): 755-778.

Savage, J.M. 2002. *The amphibians and reptiles of Costa Rica. A herpetofauna between two continents, between two seas*. Chicago: University of Chicago Press. xx+934 p.

Smithe, F.B. 1975-1981. *Naturalist's Color Guide. Part I. Color Guide. 182 Color Swatches.* New York: American Museum of Natural History.

Solórzano, A. and L. Cerdas. 1986. A new subspecies of the bushmaster, *Lachesis muta,* from Southeastern Costa Rica. *Journal of Herpetology* 20(3): 463-466.

Taylor, E.H. 1954. Further studies on the serpents of Costa Rica. *University of Kansas Science Bulletin* 36(2): 673-800.

Taylor, E.H. 1956. A review of the lizards of Costa Rica. *University of Kansas Science Bulletin* 38(1): 1-322.

Uzzell, T.M. 1966. Teiid lizards of the genus *Neusticurus* (Reptilia, Sauria). *Bulletin of the American Museum of Natural History* 132: 277-328.

Received: October 2011
Accepted: February 2012
Published online: May 2012
Editorial responsibility: Cameron Siler